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EXAMINER	
DI GRAZIO, JEANNE A	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/803,103	Applicant(s) TAMATANI ET AL.
	Examiner Jeanne A. Di Grazio	Art Unit 2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 April 2003 and 21 July 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Priority

Priority to Japanese Patent Application No. 2000-102738 (April 4, 2000) is claimed.

Response to Restriction

The Examiner sincerely thanks Applicant for Applicant's discussion concerning the Restriction of June 18, 2003. Applicant's remarks have been carefully considered and studied. Accordingly, the restriction of June 18, 2003 is withdrawn.

Response to Arguments

Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection per Amendment of April 10, 2003.

Applicant's arguments filed 10 April 2003 with respect to claim 10 have been fully considered but they are not persuasive.

With respect to claim 10, Applicant asserts that Miyake et al. (US 6,118,509), "fails to provide any guidance whatsoever toward a specific range of compression forces, much less a compression force at all, to one reading its disclosure." (Amendment of April 10, 2003, at Page 10). However, the Examiner wishes to respectfully draw Applicant's attention to the fact that claim 10 does not claim compression forces. Therefore, Applicant's arguments with respect to claim 10 are not relevant.

The Examiner furthermore notes that Applicant has included a relevant reference for claim 10 (Miyazaki Ryuji, JP-10-104642) in Applicant's IDS of April 11, 2003.

Status of Claims

Claims 1-24 (including new claims 11-24) are currently pending before the Office and are the subject of this final rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4 rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al. (US 5,978,061).

Per claim 1 (amended): A sealing material provided on a periphery of a substrate for preventing leakage of liquid crystal, projections formed by etching a film formed on the substrate, and another substrate opposing the substrate being remote therefrom by a gap and being supported by the projections, wherein an area occupying ratio of the projections with respect to a region enclosed by the sealing material is not less than (0.0001 original) 0.001 and not more than 0.003.

Per claim 2: The area occupying ratio is not less than 0.001 and not more than 0.002.

Per claim 3: The area occupying ratio is not less than 0.001 and not more than 0.0015.

Per claim 4: The film is formed of an acrylic resin.

Per claims 1-4: Miyazaki has a sealing material provided on a periphery of a substrate for preventing leakage of liquid crystal (Figure 30, seal forming an injection port, 58). Miyazaki has

spacers disposed in specified arrangements for maintaining substrate gap (Figure 19). Miyazaki teaches that spacers may be formed of acrylic resin (Col. 8, Line 5).

Miyazaki does not appear to explicitly specify that the area occupying ratio is not less than 0.001 and not more than 0.003; however, Miyazaki teaches that the distribution density of spacers (projections) should exceed 0.00002 square millimeters but be less than 0.005 square millimeters (Col. 19, Lines 49-50) for the following reasons.

If the area occupying ratio is under 0.00002 square millimeter, the mechanical strength of the spacer is insufficient and it is difficult to uniformly precisely control the distance between the two substrates (Col. 19, Lines 50-54).

If the area occupying ratio exceeds 0.005 square millimeter, low temperature bubbling occurs and display quality declines (Col. 19, Lines 54-62).

Therefore, in light of the teachings in Miyazaki, it would have been obvious to one of ordinary skill in the art at the time the invention was made to precisely set the range for area occupying ratio of spacers in a liquid crystal device to maximize spacer mechanical strength, uniformly, precisely control the distance between two substrates, and to prevent low temperature bubbling. With Miyazaki's ranges of area occupying ratio, display quality is maximized; therefore, one of ordinary skill in the art would have been motivated to select Applicant's ranges for area occupying ratios based on the desire for optimal display performance and for the other reasons as stated.

Claims 5-7 and 14-17 rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al. (US 5,978,061) in view of Fukuda (US 6,525,799 B1).

Per claims 5-7 (5 and 7 amended): Miyazaki does not appear to explicitly specify that heights of the projections are varied and different by not less than 0.05 μm and not more than 0.2 μm; however, Fukuda teaches that the peak height of spacers are in the range of 0.05 to 0.50 μm in order to prevent conduction failure between conductive particles and a metal thin film and so that improved reliability of the display can be realized (Col. 19, Lines 19-24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Fukuda in order to prevent conduction failure between conductive particles and a metal thin film and so that improved reliability of the display can be realized (Col. 19, Lines 19-24).

Per claims 14-17: Miyazaki has a sealing material provided on a periphery of a substrate for preventing leakage of liquid crystal (Figure 30, seal forming an injection port, 58). Miyazaki has spacers disposed in specified arrangements for maintaining substrate gap (Figure 19). Miyazaki teaches that spacers may be formed of acrylic resin (Col. 8, Line 5).

Miyazaki does not appear to explicitly specify that the area occupying ratio is not less than 0.001 (0.0014) and not more than 0.003 (0.0029); however, Miyazaki teaches that the distribution density of spacers (projections) should exceed 0.00002 square millimeters but be less than 0.005 square millimeters (Col. 19, Lines 49-50) for the following reasons.

If the area occupying ratio is under 0.00002 square millimeter, the mechanical strength of the spacer is insufficient and it is difficult to uniformly precisely control the distance between the two substrates (Col. 19, Lines 50-54).

If the area occupying ratio exceeds 0.005 square millimeter, low temperature bubbling occurs and display quality declines (Col. 19, Lines 54-62).

Therefore, in light of the teachings in Miyazaki, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Miyazaki to precisely set the range for area occupying ratio of spacers in a liquid crystal device to maximize spacer mechanical strength, uniformly, precisely control the distance between two substrates, and to prevent low temperature bubbling. With Miyazaki's ranges of area occupying ratio, display quality is maximized; therefore, one of ordinary skill in the art would have been motivated to select Applicant's ranges for area occupying ratios based on the desire for optimal display performance and for the other reasons as stated.

Miyazaki does not appear to explicitly specify that heights of the projections are varied and different by not less than 0.05 μm and not more than 0.2 μm; however, Fukuda teaches that the peak height of spacers are in the range of 0.05 to 0.50 μm in order to prevent conduction failure between conductive particles and a metal thin film and so that improved reliability of the display can be realized (Col. 19, Lines 19-24).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Fukuda in order to prevent conduction failure between conductive particles and a metal thin film and so that improved reliability of the display can be realized (Col. 19, Lines 19-24).

Claim 8, 10-11, and 19-20 rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki Ryuji (JP-10-104642) in view of Kajita et al. (US 6,275,280 B1).

Per claims 8 (amended), 10-11, and 19-20: Miyazaki has the steps of applying a sealing material on a periphery of a substrate in annular form except for an injection inlet for liquid crystal, overlapping another substrate onto the substrate with projections and sealing material

interposed therebetween, and injecting liquid crystal through the liquid crystal injection inlet into a region enclosed by the sealing material (Figures 1-6).

Miyazaki states that liquid crystal is injected into an injection port and held for a specified time after which the sealing resin is cured (PAJ) suggesting that the seal is cured after a specified time from injection of the liquid crystal. It may be implied in Miyazaki that the specified time ranges from not less than 30 minutes and not more than 60 minutes.

Miyazaki applies a pressurizing force to the substrates (PAJ); however, Miyazaki does not appear to explicitly specify applying a pressure of not less than 20,000Pa and not more than 40,000 Pa.

However, Kajita teaches resin spacers formed by etching (Col. 16, Lines 64-67) and a compression force of about 10,000 to 100,000 Pa that is normally applied to substrates (Col. 3, Lines 59-61).

Kajita teaches that this range of force is normal when adjoining substrates for a liquid crystal device.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Kajita for a force in the range of 20,000 to 40,000 Pa as a normal range of compressive force applied to LCD substrates.

Claim 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki Ryuji (JP-10-104642) in view of Kajita et al. (US 6,275,280 B1) and further in view of Ogura Makoto (JP-59-078320).

Per claim 9: Miyazaki does not appear to explicitly have simultaneous sealing of an injection inlet and pressure applied to both substrates; however, Ogura does have a step of fixing

sealing material to an injection opening while pressing electrode plates (PAJ). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Ogura to reduce the number of separate process steps required in the manufacturing of an LCD device and to therefore improve production and yield.

Claims 12, 13, 21, and 22 rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki Ryuji (JP-10-104642) in view of Miyazaki et al. (US 5,978,061) and further in view of Kajita et al. (US 6,275,280 B1).

Per claims 12, 13, 21, and 22: Miyazaki has the steps of applying a sealing material on a periphery of a substrate in annular form except for an injection inlet for liquid crystal, overlapping another substrate onto the substrate with projections and sealing material interposed therebetween, and injecting liquid crystal through the liquid crystal injection inlet into a region enclosed by the sealing material (Figures 1-6).

Miyazaki states that liquid crystal is injected into an injection port and held for a specified time after which the sealing resin is cured (PAJ) suggesting that the seal is cured after a specified time from injection of the liquid crystal. It may be implied in Miyazaki that the specified time ranges from not less than 30 minutes and not more than 60 minutes.

Miyazaki does not appear to specify that the area occupying ratio of spacers with respect to a region enclosed by the sealing material being designed to be not less than 0.001 and not more than 0.003; however, Miyazaki teaches that the distribution density of spacers (projections) should exceed 0.00002 square millimeters but be less than 0.005 square millimeters (Col. 19, Lines 49-50) for the following reasons. It may be implied that the spacers of Miyazaki are formed by etching a film on a substrate.

If the area occupying ratio is under 0.00002 square millimeter, the mechanical strength of the spacer is insufficient and it is difficult to uniformly precisely control the distance between the two substrates (Col. 19, Lines 50-54).

If the area occupying ratio exceeds 0.005 square millimeter, low temperature bubbling occurs and display quality declines (Col. 19, Lines 54-62).

Therefore, in light of the teachings in Miyazaki, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Miyazaki to precisely set the range for area occupying ratio of spacers in a liquid crystal device to maximize spacer mechanical strength, uniformly, precisely control the distance between two substrates, and to prevent low temperature bubbling. With Miyazaki's ranges of area occupying ratio, display quality is maximized; therefore, one of ordinary skill in the art would have been motivated to select Applicant's ranges for area occupying ratios based on the desire for optimal display performance and for the other reasons as stated.

Miyazaki does not appear to explicitly specify the magnitude of pressure applied to the substrates; however, However, Kajita teaches resin spacers formed by etching (Col. 16, Lines 64-67) and a compression force of about 10,000 to 100,000 Pa that is normally applied to substrates (Col. 3, Lines 59-61).

Kajita teaches that this range of force is normal when adjoining substrates for a liquid crystal device.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Kajita for a force in the range of 20,000 to 40,000 Pa as a normal range of compressive force applied to LCD substrates.

Claims 23 and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki Ryuji (JP-10-104642) in view of Fukuda (US 6,525,799 B1) in further view of Miyazaki et al. (US 5,978,061) and further in view of Kajita et al. (US 6,275,280 B1).

Per claims 23 and 24: Miyazaki has the steps of applying a sealing material on a periphery of a substrate in annular form except for an injection inlet for liquid crystal, overlapping another substrate onto the substrate with projections and sealing material interposed therebetween, and injecting liquid crystal through the liquid crystal injection inlet into a region enclosed by the sealing material (Figures 1-6).

Miyazaki states that liquid crystal is injected into an injection port and held for a specified time after which the sealing resin is cured (PAJ) suggesting that the seal is cured after a specified time from injection of the liquid crystal. It may be implied in Miyazaki that the specified time ranges from not less than 30 minutes and not more than 60 minutes.

Miyazaki does not appear to explicitly specify that the heights of projections being varied by not less than 0.05 and not more than 0.2 micrometers; however, Fukuda teaches that the peak height of spacers are in the range of 0.05 to 0.50 μm in order to prevent conduction failure between conductive particles and a metal thin film and so that improved reliability of the display can be realized (Col. 19, Lines 19-24).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Fukuda in order to prevent conduction failure between conductive particles and a metal thin film and so that improved reliability of the display can be realized (Col. 19, Lines 19-24).

Miyazaki does not appear to specify that the area occupying ratio of spacers with respect to a region enclosed by the sealing material being designed to be not less than 0.0014 and not more than 0.0029; however, Miyazaki teaches that the distribution density of spacers (projections) should exceed 0.00002 square millimeters but be less than 0.005 square millimeters (Col. 19, Lines 49-50) for the following reasons. It may be implied that the spacers of Miyazaki are formed by etching a film on a substrate.

If the area occupying ratio is under 0.00002 square millimeter, the mechanical strength of the spacer is insufficient and it is difficult to uniformly precisely control the distance between the two substrates (Col. 19, Lines 50-54).

If the area occupying ratio exceeds 0.005 square millimeter, low temperature bubbling occurs and display quality declines (Col. 19, Lines 54-62).

Therefore, in light of the teachings in Miyazaki, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Miyazaki to precisely set the range for area occupying ratio of spacers in a liquid crystal device to maximize spacer mechanical strength, uniformly, precisely control the distance between two substrates, and to prevent low temperature bubbling. With Miyazaki's ranges of area occupying ratio, display quality is maximized; therefore, one of ordinary skill in the art would have been motivated to select Applicant's ranges for area occupying ratios based on the desire for optimal display performance and for the other reasons as stated.

Miyazaki does not appear to explicitly specify the magnitude of pressure applied to the substrates; however, However, Kajita teaches resin spacers formed by etching (Col. 16, Lines

64-67) and a compression force of about 10,000 to 100,000 Pa that is normally applied to substrates (Col. 3, Lines 59-61).

Kajita teaches that this range of force is normal when adjoining substrates for a liquid crystal device.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Kajita for a force in the range of 20,000 to 40,000 Pa as a normal range of compressive force applied to LCD substrates.

Claim 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki Ryuji (JP-10-104642) in view of Kajita et al. (US 6,275,280 B1) and further in view of Ogura Makoto (JP-59-078320).

Per claim 18: Miyazaki has the steps of applying a sealing material on a periphery of a substrate in annular form except for an injection inlet for liquid crystal, overlapping another substrate onto the substrate with projections and sealing material interposed therebetween, and injecting liquid crystal through the liquid crystal injection inlet into a region enclosed by the sealing material (Figures 1-6).

Miyazaki does not appear to explicitly specify the magnitude of pressure applied to the substrates; however, However, Kajita teaches resin spacers formed by etching (Col. 16, Lines 64-67) and a compression force of about 10,000 to 100,000 Pa that is normally applied to substrates (Col. 3, Lines 59-61).

Kajita teaches that this range of force is normal when adjoining substrates for a liquid crystal device.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Kajita for a force in the range of 20,000 to 40,000 Pa as a normal range of compressive force applied to LCD substrates.

Miyazaki does not appear to explicitly have simultaneous sealing of an injection inlet and pressure applied to both substrates; however, Ogura does have a step of fixing sealing material to an injection opening while pressing electrode plates (PAJ). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Miyazaki in view of Ogura to reduce the number of separate process steps required in the manufacturing of an LCD device and to therefore improve production and yield.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on April 11, 2003 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609(B)(2)(i). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeanne A. Di Grazio whose telephone number is (703)305-7009. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim, can be reached on (703) 305-3492. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Jeanne Andrea Di Grazio

JDG

Robert Kim, SPE

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